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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/563,316

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EXAMINER

LACLAIR, DARCY D

ART UNIT

PAPER NUMBER

4171

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/563,316	<b>Applicant(s)</b> AOKI ET AL.	
	<b>Examiner</b> Darcy D. LaClair	<b>Art Unit</b> 4171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> .                                  | 6) <input type="checkbox"/> Other: ____.                          |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :9/69/2006, 3/24/2006, 1/04/2006.

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following change is suggested: A more detailed title with reference to the inclusion of fullerenes, which appears to be the focus of this invention, would be appropriate. "Rubber Composition Containing Fullerenes and Tires Produced from the Same" is one acceptable option.

### ***Claim Objections***

2. Claim 8 is objected to because of the following informalities: The "a" should be changed to a "the" following the word wherein. As it currently reads, only some of the total content of fullerenes is necessarily in the given ratio to carbon black and/or silica. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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4. Claims 1-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

5. It is unclear from the specification the amount of fullerenes which must be added to the composition to achieve the desired result. The specification requires that an amount between 0.1 to 10 parts by mass of fullerenes be added to the composition; however the soot and residue described are not entirely composed of fullerenes. In fact the residue would be a very minor proportion of fullerenes if an efficient extraction had been performed. Adding the soot or the residue with a trace amount of fullerenes could represent no significant improvement over adding the same quantity of carbon black, otherwise known as "lamp black" because it was originally produced by collecting combustion soot from oil lamps. It is not clear whether the soot and residue would be added in a way to give a final amount of 0.1 to 10 mass parts of fullerenes only, or 0.1 to 10 mass parts of the soot and/or the residue.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 1, 5, 7, and 9 (and those dependent on them) require specific concentrations or quantities of fullerenes, however they recite addition of fullerenes via use of soot or residue, which are not entirely composed of fullerenes. In fact the residue would be a very minor proportion of fullerenes if an efficient extraction was being utilized. It is not clear whether the soot and residue would be added in a way to give a final amount of 0.1 to 10 mass parts of fullerenes only, or 0.1 to 10 mass parts of the soot and/or the residue.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-10 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Lukich et al. (US 5,750,615), with support from Curl et al. (Scientific American 1991)

11. Claims 1-5 and 7-10, recite a tire with various parts formed of a rubber composition of 100 parts by mass of a rubber component, 0.1-10 parts by mass of fullerenes, 20-70 parts by mass of carbon black, ,. Lukich teaches a tire having a tread of a rubber composition comprised of 100 parts of at least one diene based elastomer, about 30-100 parts of particulate elastomer reinforcement composed of 5-100 weight percent of at least one fullerene carbon, where the formula of the fullerene is  $C_{2n}$  with

n= at least 15 and preferably 30, and from 0-95 weight percent of at least one carbon black and precipitated silica. (col 2 line 34-64)

a. Claims 1, 5, and 8 require that the fullerenes be (1) 0.1 to 10 or (5) 0.3 to 8 parts by mass of fullerenes, and (8) that they be in a ratio of 0.3 to 50% by mass of the carbon black and/or silica. With regard to those limitations, Lukich specifies a range of 30 to 100 parts of particulate, with 5 to 100% being fullerenes. This significantly overlaps applicant's claimed range of fullerenes. Lukich further teaches that the remainder of the particulate, which is carbon black and/or silica, be from 0 to 95% weight. This range encompasses applicant's claimed range of 0.3 - 50 % carbon black and/or silica. (col 2 line 34-64)

b. With regard to the limitation in claim 1, 3, 4 and 9 that the fullerenes be produced by a combustion method, "if the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." See *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

c. A fullerene is a highly stable molecule of a very particular structure. It is unlikely that a C<sub>60</sub> fullerene would be sufficiently different in structure based on the method used to produce it. Curl et al. teaches that the most convenient way to generate fullerenes is the arc method, however a sooting flame will also produce C<sub>60</sub>, and that may eventually be the most cost effective method of making the material. (p. 59 col 1) This supports the assertion that there is no structural or chemical difference in these methods of production.

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- d. With regard to claim 1 and 9, in reference to a fullerene with a closed basket structure represented by  $C_{2n}$ , Lukich specifies that by fullerene, they mean any fullerene having at least one corrannulene ring structure, or a circular basket structure. (col 2 line 25-26) It is further taught that the preferable range of carbon atoms,  $n= 30-40$ , results in a closed cage structure of carbon atoms. (col 2 line 31-33) As applicant points out in paragraph 2, fullerenes typified by  $C_{60}$  and  $C_{70}$  are disposed in the shape of a spherical basket. It is apparent that the structures taught by the instant application and Lukich are equivalent.
12. With regard to claim 2, which requires that the carbon black be between 20 and 70 parts by mass, Lukich teaches that between 0 and 95% by weight of the filler, which is 30 to 100 parts by weight of the resin. (col 2 line 34-64)
13. With regard to claim 3 and 4, which require that the fullerenes comprise either the soot including fullerenes (raw product) or the residue generated by fullerene extraction, Lukich demonstrates an example in which a resin blend is prepared using fullerene carbon soot after fullerene removal (corresponding to applicants "residue"). (Table 2)
14. With regard to claim 6, which requires wet silica and a silane coupling agent, Lukich teaches an alternative embodiment which additionally contains silica and a silica coupling agent (corresponding to applicant's silane, or  $SiH_4$ , coupling agent). (col 8 line 48-54)

15. With regard to claim 7, which requires 10 to 90 parts by mass of filler per 100 parts of resin, Lukich teaches 30-100 phr (parts per hundred parts of resin), which encompasses applicant's range.

16. Claim 9 and 10 require that the rubber member of the tire, could be the tire, the tire tread, an under tread, or a side wall. Lukich teaches with a focus on the tire tread, however it is clarified that while the focus has been on the tread rubber, the invention is not limited to such. This suggests that the teaching could readily apply not only to other parts of the tire, but also to other elastomers used in other applications.

### ***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lukich et al. (US 5,750,615)

19. Claim 3 and 4 require that the fullerenes are obtained either from the soot including fullerenes (raw product) or from the residue left after extraction of fullerenes. Lukich teaches an example in which fullerenes extracted from fullerene soot are used in a composition, as well as an example in which fullerene soot following extraction is used in a composition. This is the two separated components of the raw product. They demonstrate that both produce a functional product. Since each component,

exclusively, was able to be used to form a composition, it stands to reason that both together could also be used to form a composition. In order to save money on a processing step, it would be obvious to skip the separation step and use the raw product, or applicant's soot, directly.

20. Claims 1, 3, 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lukich et al. (US 5,750,615), further in view of Curl et al. (Scientific American 1991)

21. With regard to the limitation in claim 1 and 9 that the fullerenes be produced by a combustion method, Lukich teaches that fullerenes may be produced by laser evaporation of graphite, (col 5 line 41-42) but specifies that fullerenes may be synthesized by methods known in the art or purchased. (col 5 line 60-61) Lukich fails to teach specifically the method of combustion for obtaining fullerenes.

22. Curl et al. teaches that the most convenient way to generate fullerenes is the arc method, however a sooting flame will also produce C<sub>60</sub>. He outlines that the sooting flame (or combustion method) may eventually be the most cost effective method of making the material. (p. 59 col 1) From the standpoint of economics, it would be obvious to seek the most cost effective method of obtaining a source material, as long as the material and its properties remained the same. Fullerene is a highly stable molecule of a very particular structure, therefore it would be obvious to obtain fullerene by the most cost effective method (sooting flame or combustion).

### ***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

24. Maly et al. (US 6476154), which discloses the use of carbon black in curable rubber compounds. In this document, Maly indicates that fullerene may be a component of the carbon black, and silica may be included in the composition. This document is particularly relevant for the case of (2) a soot including fullerenes generated in a process of producing fullerenes obtained by the combustion method and (3) a residue generated by extraction of fullerenes from the soot.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Thursday 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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